PATENT COOPERATION TREATY

PCT/EP2004/013447

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44*bis*.3(c) and 72.2)

To: LTF-206-PCT

MÜLLER, Frithjof, E.
Möller . Hoffmann & Partner
Innere Wiener Strasse 17
81667 München
ALLEMAGNE

EINGEGANGEN
MÜLLER • HOFFMANN & PARTNER
-4. Jan. 2007
Frist .....

Date of mailing *(day/month/year)* 28 December 2006 (28.12.2006)	
Applicant's or agent's file reference 56205 MÜ/rs	**IMPORTANT NOTIFICATION**
International application No. PCT/EP2004/013447	International filing date *(day/month/year)* 26 November 2004 (26.11.2004)
Applicant LITEF GMBH et al	

1. **Transmittal of the translation to the applicant.**

☐ The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).

☑ The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. **Transmittal of the copy of the translation to the designated or elected Offices.**

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

KR

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. **Reminder regarding translation into (one of) the official language(s) of the elected Office(s).**

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Agnes Wittmann-Regis
Facsimile No. +41 22 338 82 70	Facsimile No. +41 22 338 82 70

Form PCT/IB/338 (January 2004)

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
56205 Mü/rs		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2004/013447	26.11.2004	23.12.2003

International Patent Classification (IPC) or national classification and IPC

G01C19/56

Applicant

LITEF GMBH

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 8 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))

      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/013447

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 6-15 as originally filed/furnished

pages* 1-5,5a received by this Authority on 24.10.2005 with letter of 24.10.2005

pages* _____ received by this Authority on _____

☒ the claims:

nos. _____ as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* 1-8 received by this Authority on 24.10.2005 with letter of 24.10.2005

nos.* _____ received by this Authority on _____

☒ the drawings:

sheets 1/4-4/4 as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/013447

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-8	YES
	Claims		NO
Inventive step (IS)	Claims	1-8	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. **Technical field:**

The invention concerns a method for quadrature nulling in a Coriolis gyroscope, and a corresponding Coriolis gyroscope.

2. **Independent claims**: claim 1 (method) and claim 4 (device).

3. **Prior art:**

Reference is made to the following documents:

D1: US-A-2003/061877; ROBERT E. STEWART ET AL; 3 April 2003, in combination with US-A-2003/159510; ROBERT E. STEWART ET AL; 28 August 2003

D2: WO-A-03/058167; ROBERT BOSCH GMBH; 17 July 2003

D3: US-A-6 067 858; CLARK ET AL; 30 May 2000.

Document D1, which is considered the closest prior art, discloses (the references between parentheses relate to the relevant documents), a Coriolis

gyroscope and to a method for quadrature nulling in a Coriolis gyroscope (see the title). The Coriolis gyroscope has a resonator consisting of a coupled system of a first oscillator (first dither mass 87) and a second linear oscillator (first proof mass 89), and a device for creating an electrostatic field (quadrature null regions 93, 105 and quadrature forcer electrodes 121, 127) (see, for example, page 1, paragraphs 14 to 17; page 2, paragraph 21, and figures 1, 2). A device for determining the quadrature bias of the gyroscope and a closed-loop control circuit for the closed-loop control of the electrostatic field so as to reduce the quadrature bias as much as possible, is implied in document D1, since document D1 refers to document US-A-2003/159510, which is by the same applicant, for a more detailed description of the way in which quadrature nulling functions. In said document (see, for example, page 2, paragraph 26, to page 3, paragraph 30, and figures 2, 3), the use of a closed-loop control circuit for the closed-loop control of the electrostatic field is described. For quadrature nulling, alternating forces acting on the resonator are produced using the device generating an electrostatic field.

Documents D2 and D3 describe similar methods and Coriolis gyroscopes wherein alternating forces are likewise used for quadrature nulling (D2: see, for example, page 8, last paragraph, to page 16, first paragraph, and figures 1 to 3; document D3: see,

for example, column 4, line 14, to column 8, line 32; column 13, line 60, to column 15, line 12, and figures 1, 2, 7a, 7b, 7c and 14). The yaw rate sensor of document D2 consists of a first (excitation) oscillator, a second (Coriolis) oscillator and a third (detection) oscillator. The electrostatic forces are applied to the second oscillator, it being possible for the dynamic forces to be superimposed by static forces. This sensor does not have a frame.

4. Novelty - PCT Article 33(2)

4.1 Independent claims 1 and 4:

The subject matter of independent claims 1 and 4 differs from the closest prior art document D1 in that the electrostatic field generates an equilibrium force (that is to say, a static force) which brings about a change in the orientation of first spring elements which attach the first oscillator to the frame and/or a change in the orientation of second spring elements, which connect the first oscillator to the second oscillator. Consequently, the subject matter of claims 1 and 4 is novel over document D1. The other documents are less relevant.

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

5. Inventive step - PCT Article 33(3)

5.1 Independent claim 1:

The special arrangement and control of the electrodes for the production of a static equilibrium force solve the objective technical problem of achieving simpler and more effective quadrature nulling. By the mutual orientation of the two oscillators relative to each other the orientation of the spring elements by which the oscillators are connected is changed, and in this way the quadrature is effectively nulled at its point of origin. To this end, nothing more than a simplified electrode arrangement is required. An electrode arrangement of this kind for the production of an equilibrium force is not known from or suggested by the cited prior art. Consequently, the requirements of PCT Article 33(3) are met.

5.2 Dependent claims 2 to 3 and 5 to 8:

Dependent claims 2 to 3 and 5 to 8 concern additional features of independent claims 1 and 4, to which they refer back, and are therefore considered novel and inventive.

6. Industrial applicability (PCT Article 33(4))

The invention claimed in claims 1 to 8 is industrially applicable in the field of quadrature

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

nulling in Coriolis gyroscopes.